SECTIONS AID IN IDENTIFYING HAIR

By Ned Dearborn

Hairs from different mammals often differ from one another in form and size. Many kinds of mammals in temperate and frigid zones have the equivalent of two coats. The inner one, called underfur, consists of fine short hairs closely packed together. This is a shield against cold and dampness. Scattered among the underfur are coarser and much longer hairs, called guard hairs, which expand in thickness above the underfur to form the outer coat. This outer coat hides the inner one and protects it from wear. Pigments, which give animals their color, are contained in the expanded part of the guard hairs above the underfur.

Underfur hairs and the part of guard hairs surrounded by them are more or less cylindrical, without distinctive form. But the broad portion of guard hairs, above the underfur, may be formed so peculiarly as to be diagnostic of a family or even a genus. Other features of guard hair blades, that may be distinctive, are their size and their medullary pattern. A comparison of these characters of hairs from mammals the world over reveals curious peculiarities in some cases, and interesting parallelisms in others.

The object of this paper is to set forth structural features of guard hairs from mammals of a single region as an aid in identifying hairs of unknown origin, such as may be found in the stomachs and excreta of carnivores. Structural peculiarities can be seen in cross sections and in optical longitudinal sections of guard hair blades. A complete series of cross sections from base to tip of wisps of guard hairs and underfur together, as they grew, shows the relative form, length, and size of these two kinds of hair. Occasionally, among typical guard hairs, will be found one that is larger, longer, and more nearly cylindrical than the ordinary form. These exceptional hairs, which may be termed bristles, are of no use in identification. Guard hairs of young animals increase in size as the animal grows to maturity, without a change of form.

A convenient plan to pursue is to make in advance, camera lucida drawings of cross and optical longitudinal sections of hair from all of the more obscure mammals found in a given vicinity, as appear in figure 1 By arranging such drawings in a vertical column, they can be run along beneath the mirror of the camera lucida and compared in turn with sections of an unknown hair under the microscope. Unless the magnification of the unknown hair is the same as that used in making the drawing, identification is questionable, inasmuch as *size* is important as well as *form*. Thus it is possible to superimpose the image of the unknown hair on any of the series of drawings. Very often identity can be established by size and form of cross section alone. When different species of mammals have hair similar in form and size, recourse must be had to optical longitudinal sections, which show the medullary

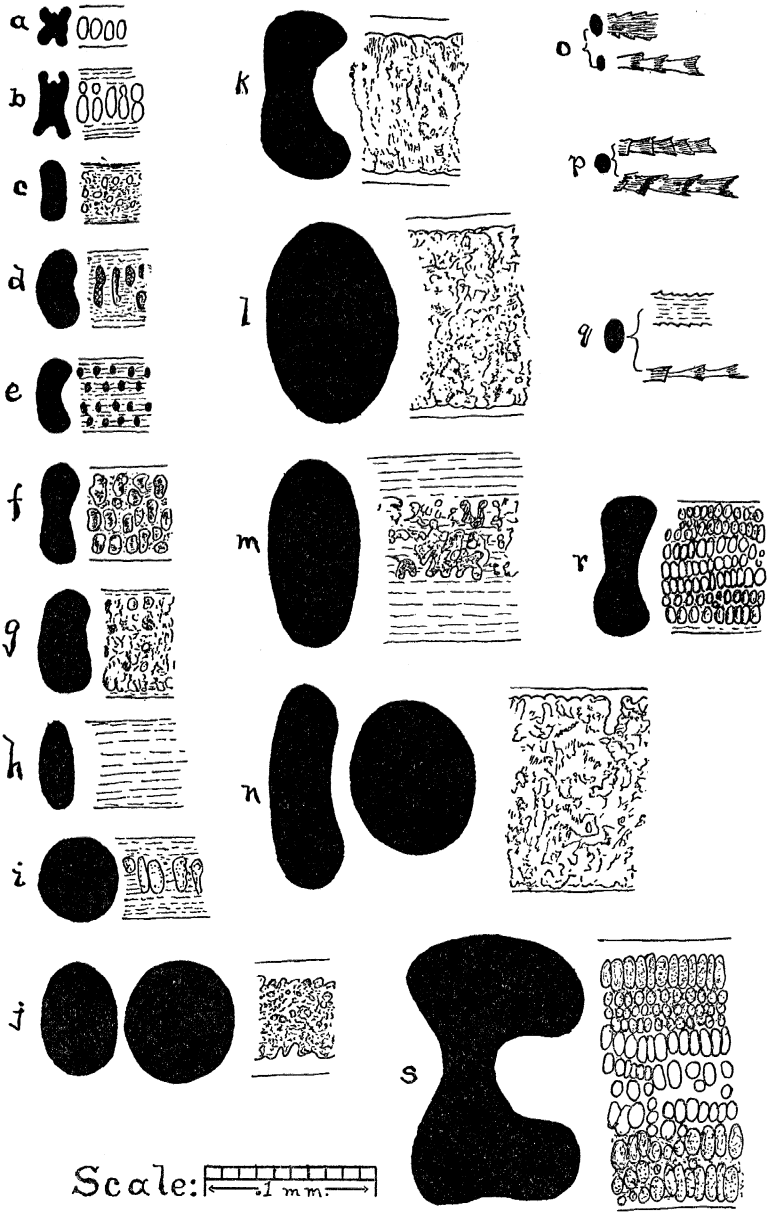

FIG. 1. Cross, and optical longitudinal sections of guard hairs from 19 rodents and insectivores found in northeastern United States. The species represented here are: a, *Sorex cinereus;* b, *Blarina brevicauda;* c, *Glaucomys volans;* d, *Peromyscus leucopus;* e, *Mus musculus;* f, *Pitymys pinetorum;* g, *Microtus pennsylvanicus;* h, *Scalopus aquaticus;* i, *Condylura cristata;* j, *Tamias striatus;* k, *Citellus tridecemlineatus;* l, *Zapus hudsonicus;* m, *Ondatra zibethica;* n, *Rattus norvegicus;* o, *Lasionycteris noctivagans;* p, *Nycteris borealis;* q, *Myotis lucifugus;* r, *Lepus americanus;* s, *Sylvilagus floridanus.*

patterns. By referring to figures l and m of the illustration it will be noted that the medullary arrangement of hairs from *Zapus* and *Ondatra* is far more distinctive than the form or size of cross sections.

Hilton Village, Virginia

NOTES ON SOREX MERRIAMI DOBSON

By Seth B. Benson and Richard M. Bond

Study of specimens of shrews recently obtained in California has led us to conclude that *Sorex merriami* Dobson and *Sorex leucogenys* Osgood are subspecies of the same species rather than distinct species. Because *merriami* has priority the names of the two forms become *Sorex merriami merriami* Dobson and *Sorex merriami leucogenys* Osgood.

The first specimen of *Sorex merriami merriami* collected in California was taken on October 8, 1935, in Indian Well Cave, Lava Beds National Monument, Siskiyou County, by Annie M. Alexander and Louise Kellogg. This locality is near the upper limit of the Upper Sonoran life-zone. On August 12, 1937, Bond made a collection of about 1400 barn owl and horned owl pellets at Petroglyph Cliffs, approximately 10 miles northeast of Indian Well Cave, in Modoc County. This locality also is in the Upper Sonoran life-zone, but somewhat lower zonally than Indian Well Cave. Among remains of more than 3000 mammals present in the pellets were incomplete skulls of three shrews, two *Sorex merriami* and one *S. vagrans amoenus* Merriam. The former are the first shrews of this species recorded from California (Bond, 1939, p. 58). As far as we know, these three specimens of true *merriami* are all that have been collected in the state.

Inasmuch as *Sorex merriami*, until the present, has been known only from very meager material, and in view of the fact that the new localities are on the southern margin of the known range of true *merriami*, hence close to the area occupied by *S. leucogenys*, we made a careful comparison of the two forms. The specimens, together with the data given by Jackson (1928), show that the differences between them is even less than indicated by Benson (1935, p. 447), and that in some characters there is intergradation.

Our evidence concerning the relationship between the two forms is better than that available to Jackson when he revised the North American members of the genus. He had only five imperfect specimens of *merriami*, and only three specimens of *leucogenys*. We have available, in addition to the data given by Jackson, three specimens of *merriami* and eight of the ten known specimens of *leucogenys*. It is interesting to note that of the eighteen specimens so far extant of these shrews, half of them have been trapped by Miss Alexander and Miss Kellogg. Of the remaining nine, four were taken by four